MIDAS

Man-machine Integration Design & Analysis System

A comprehensive computational tool for the analysis and design of systems requiring human interaction

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Space Shuttle Development Conference
Ames Research Center
July 29, 1999

Introduction

- MIDAS Definition
  - MIDAS Structure
  - User interface
- Application to Space Shuttle Upgrades
- Payoff
- Summary

MIDAS

Man-machine Integration Design and Analysis System

Goal: Develop a computer-aided engineering system for human factors analysis/design.

- Combine 3-D rapid prototyping methods,
- embedded human performance models, and
- advanced simulation techniques

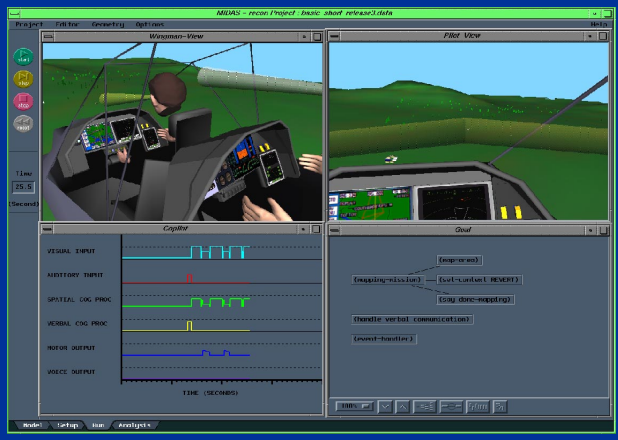
- Simulate the human operator from perception to action

- Move crew station design/procedural iterations from hardware to software and reduce design cycle time.

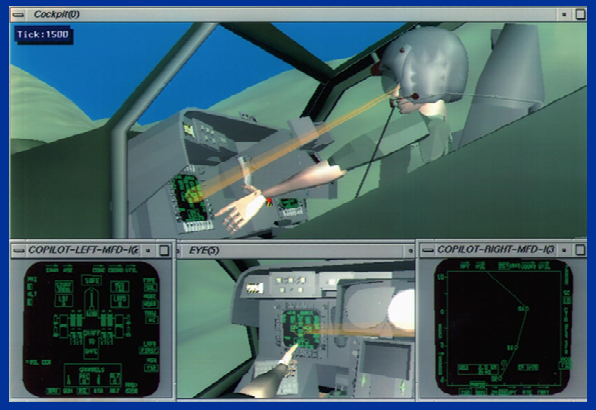
MIDAS Research Station

Data Input

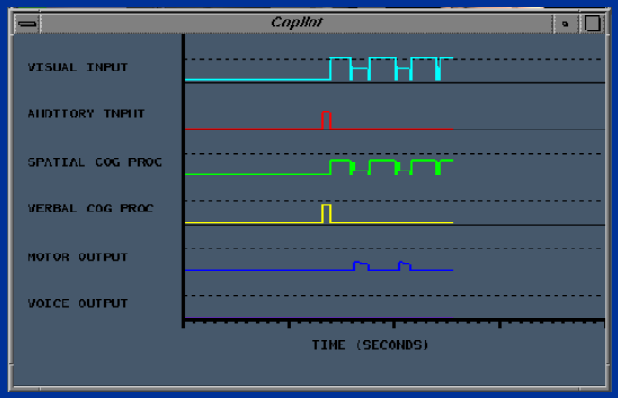
- Crewstation Designers
- Human Factors Analysts
- Cognitive Modelers



Run Time Visualization

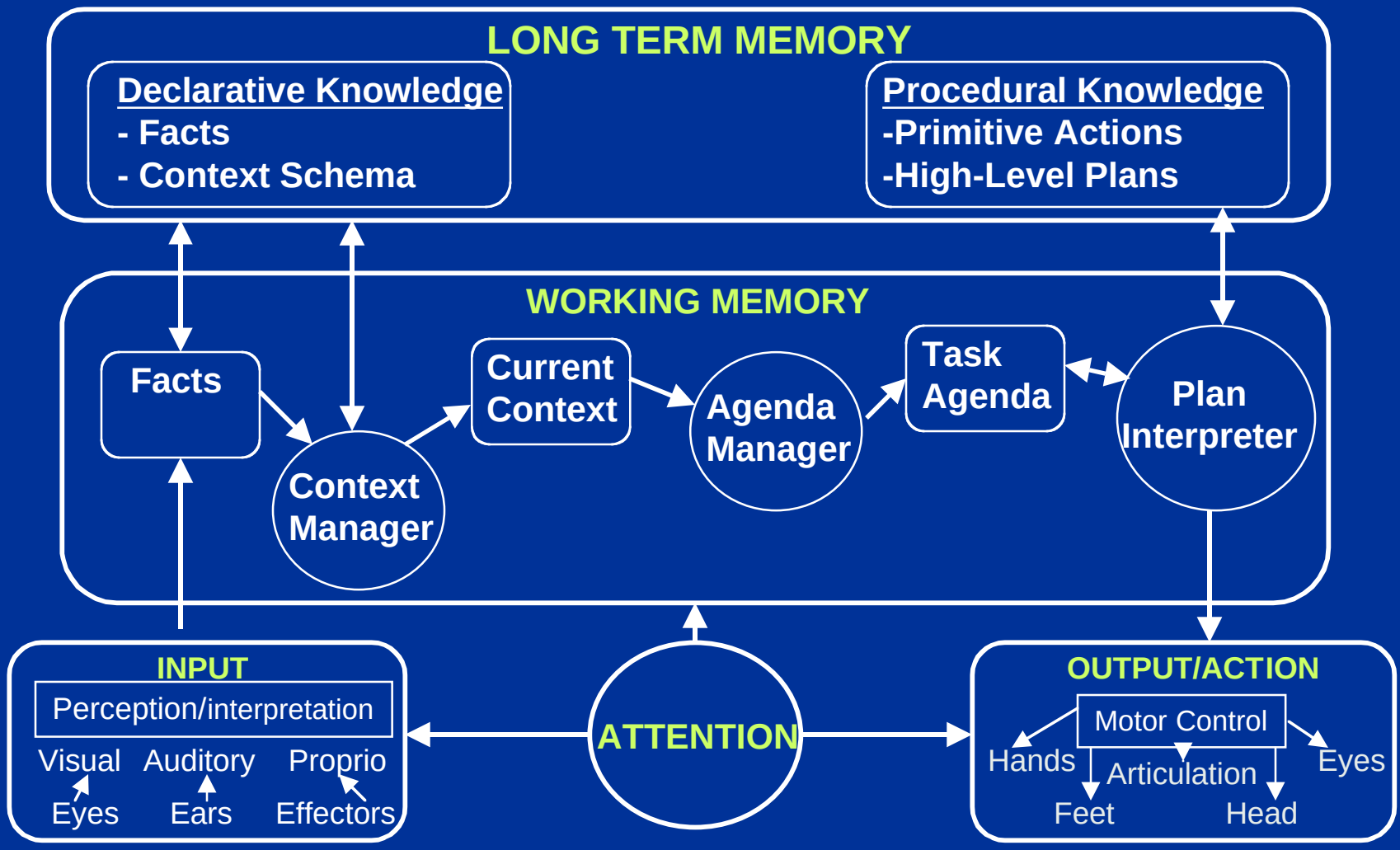


Off Line Human Factors Analysis



Data Analysis

Human Performance Model: Overview



Analysis and Design

Simulation Requirements:

- Sketch of simulation
- Definition of accessed equipment (Functionality)
- Scenario (Operator interaction, Events)
- Data Requirements

MIDAS Interface:

- Editors
- Dynamic Simulation
- Run Time Displays

MIDAS Output:

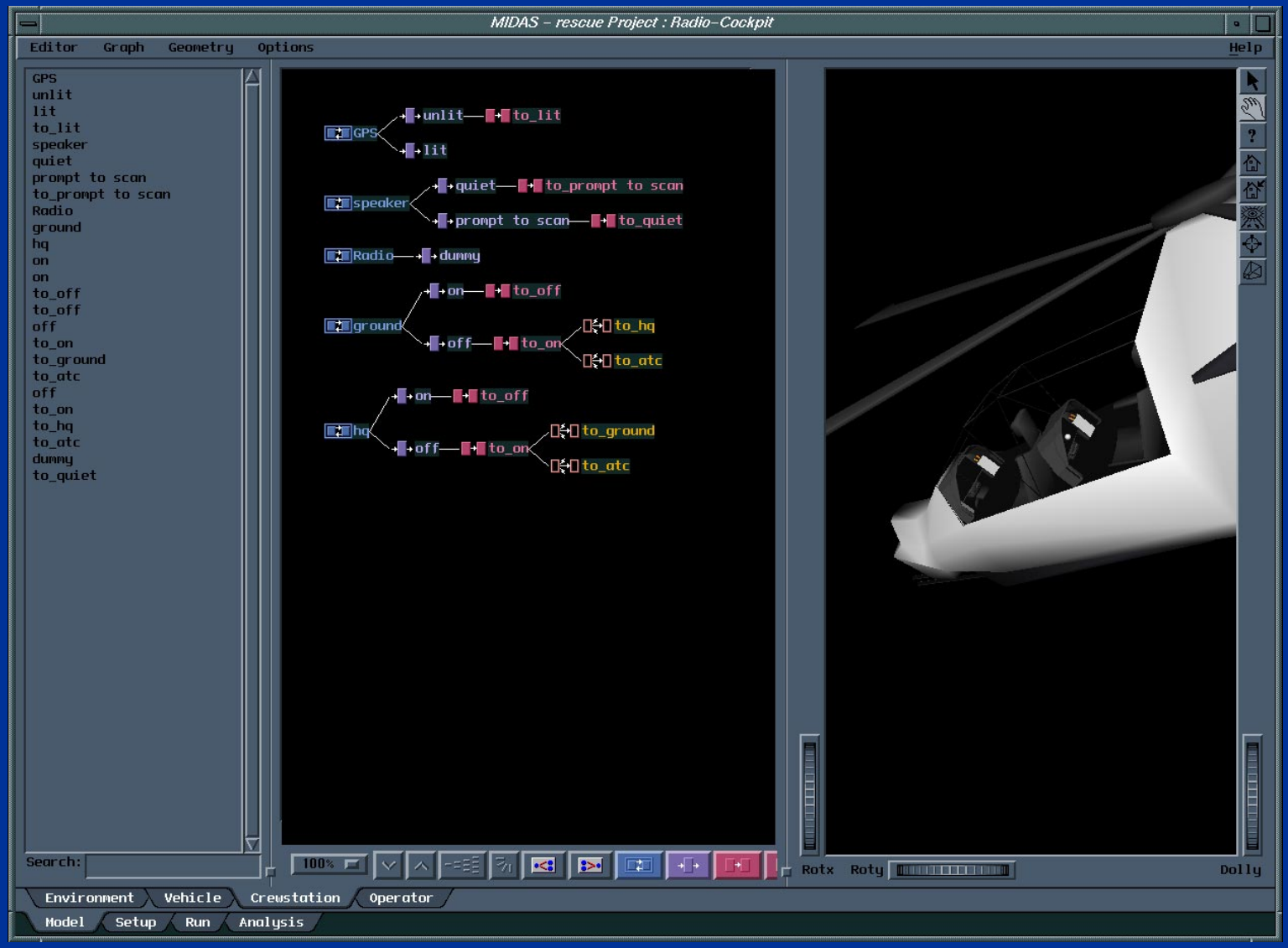
- Operator Behavior, Workload, Timelines, Situation Awareness, …, Data Analysis

User Interface

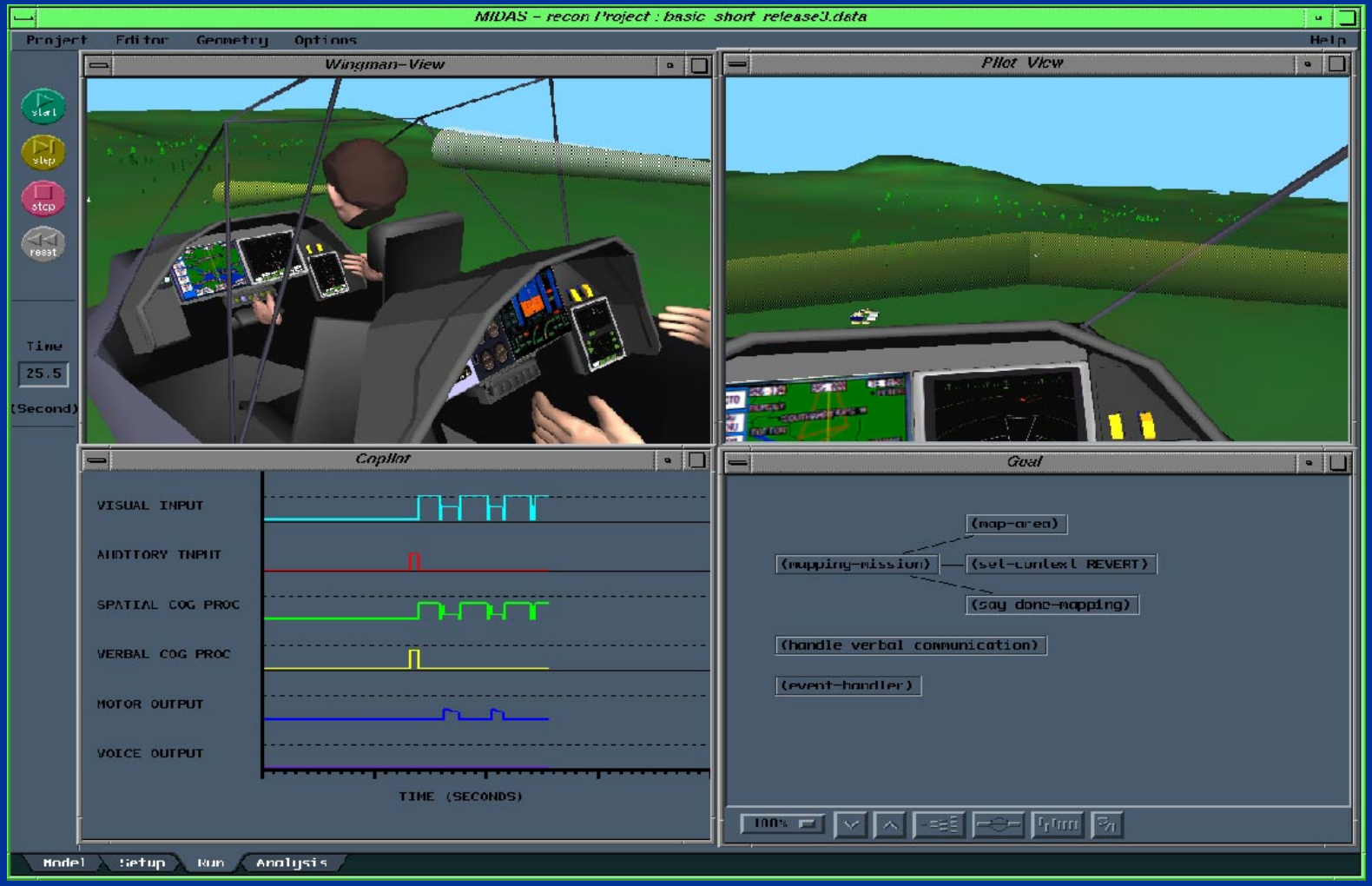
MIDAS Editors

- **Model Definition**
  - Environment, Crew Station,Vehicle
  - Operator
    - Physical (Anthropometry)
    - Sensory (Auditory and visual properties)
    - Knowledge (Initial declarative knowledge LTM)
    - Basic Procedures (Operator behavior)
    - Cognition (Operator's context)
    - Configuration (Assemble Operator)
- **Simulation Setup**
  - Scenario (construct run tree, events, displays)

MIDAS Editors

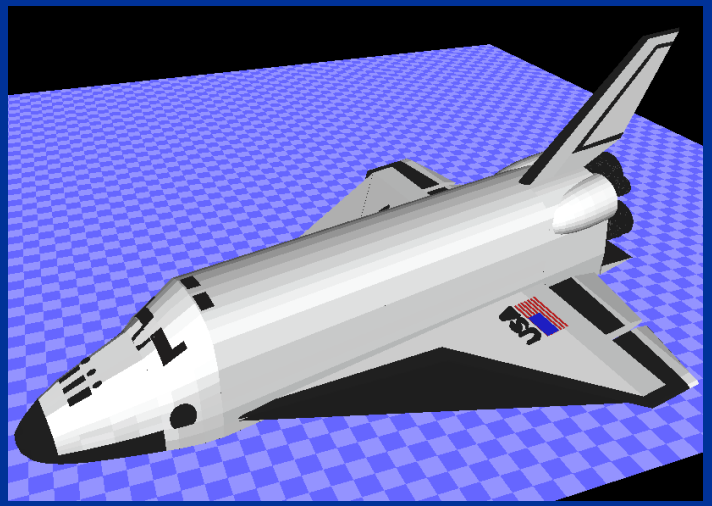


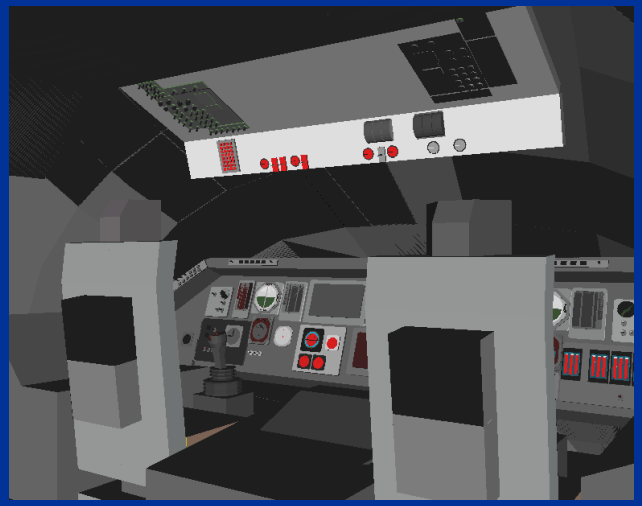
Run Time Display



Space Shuttle Design Studies

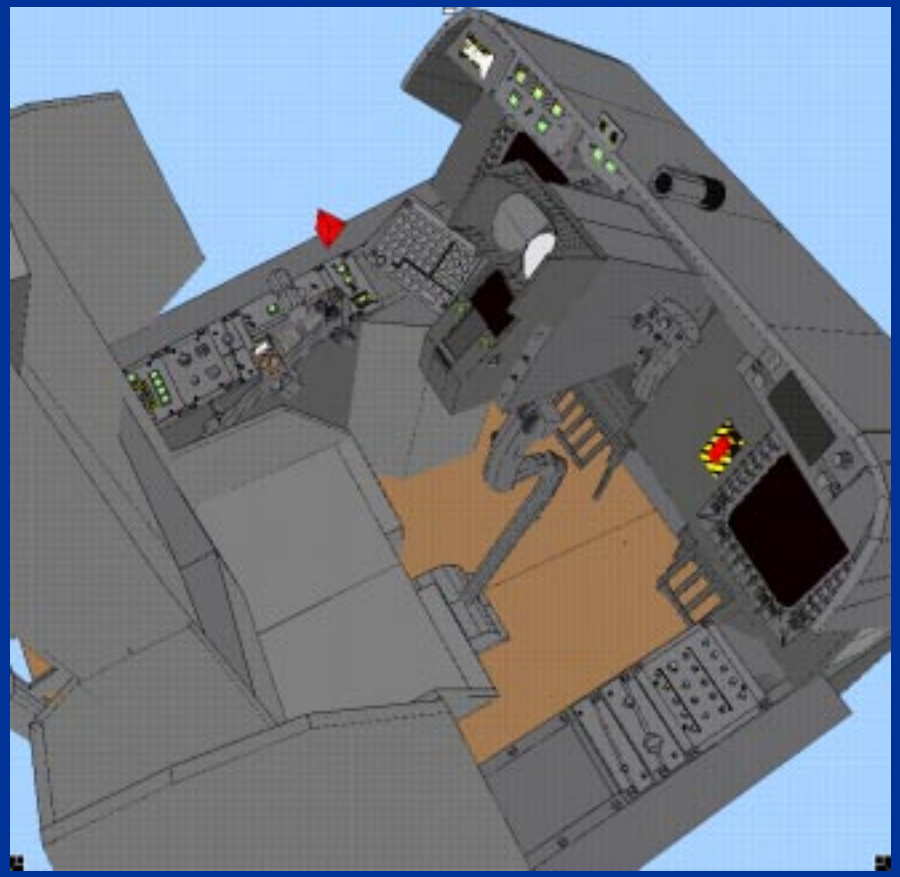
- Display Lay-out and Format Evaluations
- Procedures Development and Evaluation to Reduce Workload
- Communications Evaluation
- Assess Capability of Distributed Mission Control Center





Design Studies

- Display Lay-out and Format Evaluations

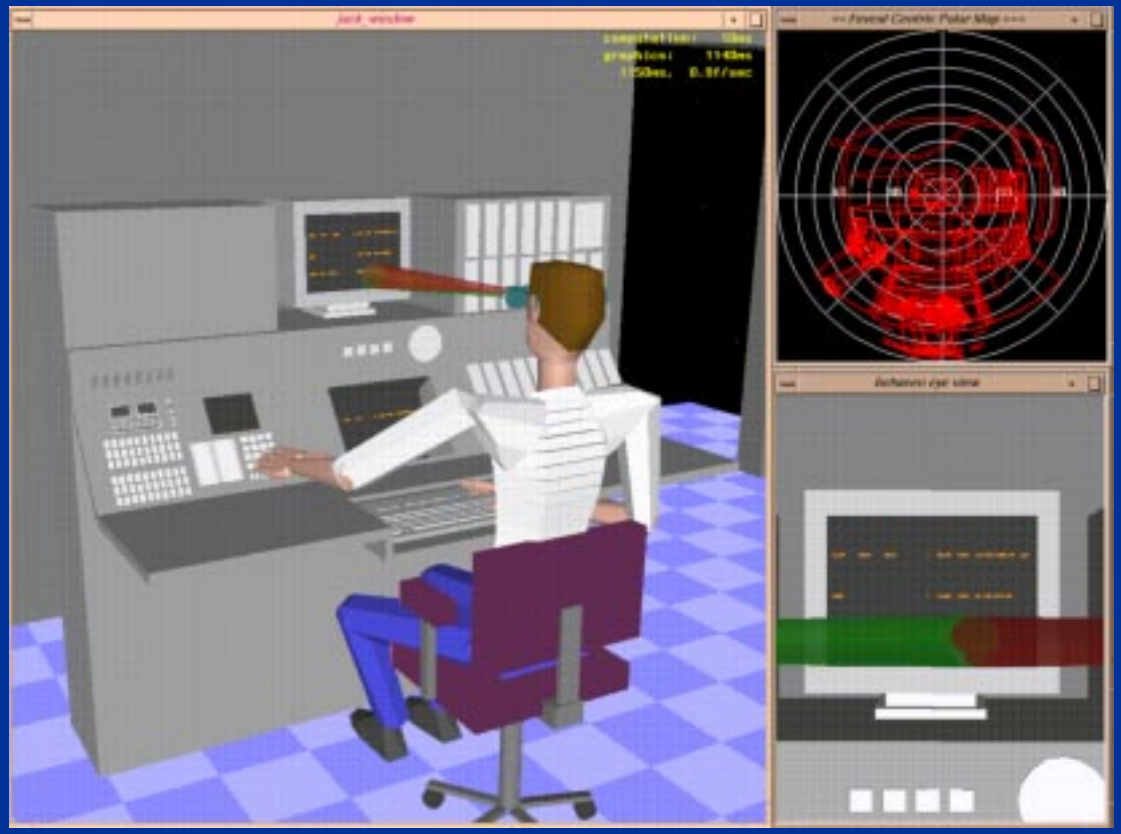


Space Shuttle Upgrades

- **Advanced Orbiter cockpit**

Design Studies

- Display Lay-out and Format Evaluations
- Procedures Development and Evaluation to Reduce Workload



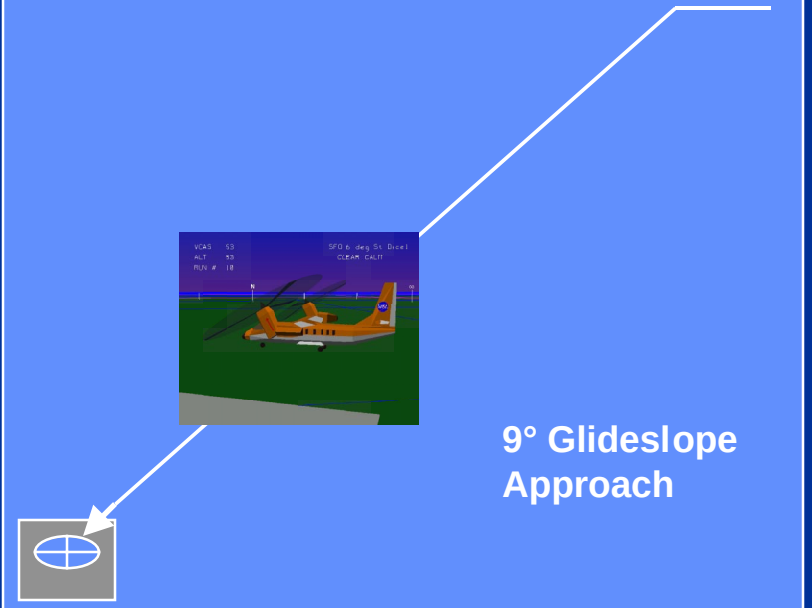
Space Shuttle Upgrades

- **Advanced Orbiter cockpit**
- **EMEDS**

Design Studies

- Procedures Development and Evaluation to Reduce Workload
- Communications Evaluation

Civil Tiltrotor - Steep descent approach for noise abatement

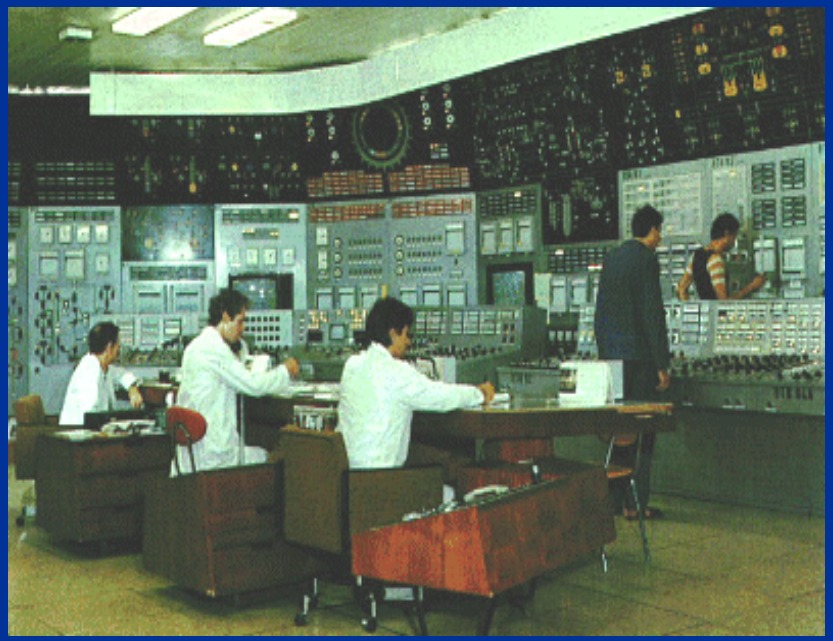


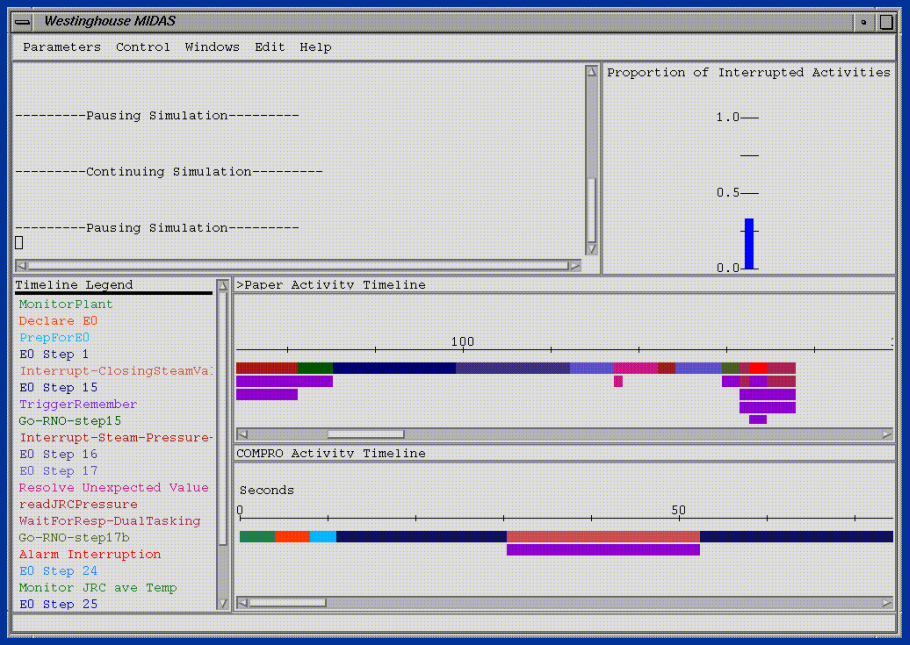
Space Shuttle Upgrades

- **Advanced Orbiter cockpit**
- **EMEDS**
- **Flight safety**

Design Studies

- Assess Capability of Distributed Mission Control Center
- Communications Evaluation





Space Shuttle Upgrades

- **Distributed Mission Control Center**

Payoff

- Support for Concept Development: What if ?
- Full assessment of proposed concepts
- Performance, Workload and Situation Awareness Evaluation
- Reduced design cycle time and cost

Lower Cost

Summary

- MIDAS is a Mature Human Factors Tool
- Rapid Prototype Environment - Dynamic Simulation - What If?
- Models Human From Perception to Action
- Beta Release
- Information:

www-midas.arc.nasa.gov

Demo Booth on site